



Habilitation Thesis Reviewer's Report

Masaryk University	Faculty of Science
Faculty	Plasma Physics
Procedure field	Mgr. Zdeněk Navrátil, PhD
Applicant	Department of Physical Electronics
Applicant's home unit, institution	Optical Emission Spectroscopy of Non-Thermal Plasma
Habilitation thesis	Professor Milorad Kuraica, PhD
Reviewer	University of Belgrade, Faculty of Physics
Reviewer's home unit, institution	

Review

The habilitation thesis of Zdenek Navratil belongs to the field of plasma physics and is a summation of a detailed research and development of methods in plasma diagnostics. This substantial work has so far produced high quality results and gave significant contribution to the field of plasma physics on an international level.

The most prominent matter presented in the thesis is a large number of experimental methods and discharge plasma sources for which the candidate has demonstrated the application of these methods.

In addition to classical methods of optical emission spectroscopy (OES) I would point out the cross-correlation spectroscopy, method for measurement of non-emitting particles based on self-absorption, laser absorption spectroscopy, methods for measurement of reduced electric field in plasma, application of forbidden and allowed line of Helium for electric field measurement.

It should be pointed out that candidate was mostly focused on the application of diagnostic methods which are non-perturbing to plasma, and that perturbing methods were only used when it was necessary e.g. for comparison of results and testing of theoretical models. Particular quality of the work of the candidate is the parallel development of collisional-radiative models (CR) and comparison of results obtained in the theoretical model and experimentally obtained results. By this, a profound understanding of plasma processes is achieved, and observation of key phenomena that create new ideas for new experimental verifications.

Also, I consider of great importance that the candidate so far in his career has established a high level of international collaboration (Institute of Plasma Physics Greifswald, University of Belgrade etc.) and by that has secured a platform for successful continuation of the career in science.

A good example of the important work is the development of the method for measurement of concentration of non-emitting particles in which the candidate has given his key contribution. The advantage of this experimental technique is in its simplicity, without requirement for special instrumentation.

In his work so far, the candidate has demonstrated his attitude towards diagnostic methods and their applications in the sense that they are not the aim by themselves but rather that they should be used for understanding of key plasma processes to the aim of optimization of plasma reactors. Therefore the candidate always considers the potential for application of plasma sources which are the object of his research - an outstanding quality of the investigator. Several experiments are directly aimed at applications.

The impact of the candidate's work is indisputable which is evident by a substantial number of articles in important international journals and significant number of citations.

Reviewer's questions for the habilitation thesis defence (number of questions up to the reviewer)

1. I would like the candidate to, based on his experience, give a sketch of an experimental setup for measurement of concentration of non-emitting particles in atmospheric pressure discharges (DBD) under the assumption that such request is given by a purchaser who intends to form a new laboratory. Please give the estimate of the necessary equipment and budget.
2. The same as in the previous question but for:
 - a) Measurement of E/N using cross-correlation spectroscopy.
 - b) Measurement of electric field strength using forbidden/allowed lines of helium.
3. The candidate may be considered as an expert: if a certain company would intent to invest in the technology of plasma deposition of thin organic films, what would be his recommendation in terms of: electrode configuration, characteristics of power sources, cooling and assessment of maximal productivity etc.

Conclusion

The habilitation thesis entitled "Optical Emission Spectroscopy of Non-Thermal Plasma" by Zdeněk Navrátil *fulfils* requirements expected of a habilitation thesis in the field of Plasma Physics.

In Belgrade on
30.9.2019.